

# Proposed FY 2017 Field Work Summary - Construction Preparation

- Perform detailed beaver dam complex survey and inspection.
  - Document the current conditions of the dams and obtain more detailed information on the existing beaver dam/pond complex.
  - Information obtained during survey will provide necessary information for field engineering and proper sizing of gabion dams prior to construction.
  - Work Plan was developed by and reviewed by licensed Professional Engineers (PE), licensed professional geologists (PG), and certified hydrogeologists (CHG).
  - Field engineering and sizing of gabions, rip rap and similar will be performed under the supervision of a licensed PE.
- Establish alluvial material erosion and transport control measures and stormwater BMPs throughout work area.
- Dewater Beaver Ponds 3, 4, 5 and divert Leviathan Creek flow around these ponds using temporary piping similar to previous work in beaver ponds.
  - Diverted water will discharge into Beaver Pond 2 to allow settling of material suspended during diversion.
  - Energy dissipation methods such as rip rap placement may be used as necessary at the pipe outlet.

## Proposed FY 2017 Field Work Summary – Access & Gabion Dam Construction

- Construct temporary access road near Beaver Dam 5 at washed out haul road to cross to the west side of the creek in order to perform construction activities.
  - Temporary access may involve placement of crane mats or similar if pond can be completely dewatered, or placement of a temporary culvert and clean fill material to allow equipment crossing.
- Construct lower elevation, flow-through gabion dams just downstream of Beaver Dams 3 and 5, only high enough to retain sediment behind existing dams.
  - Lower elevation gabion dams will significantly reduce the impounded water volumes behind these dams. Beaver Dam 4 will be eliminated entirely.
  - Gabions used for dam construction are anticipated to measure only 2-3 feet high, significantly smaller than the existing beaver dams.
  - Gabions will be constructed of 316L stainless steel or PVC coated steel for improved durability.

## Proposed FY 2017 Field Work Summary – Existing Dam Removal

- Remove Beaver Dams 3, 4 and 5 using typical construction equipment such as backhoes or excavators.
  - Woody debris removed from the dam locations will be hauled off-site for disposal or stockpiled for future disposal.
- Remove dewatering and diversion controls to allow flow to resume in Leviathan Creek.
- Information obtained from this FFS will be used to inform the evaluation of risk from these conditions and remedial alternatives in the Feasibility Study (FS), and these remedial technologies may be integrated as components of the final site remedy.

## Proposed FY 2017 Field Work Summary – Test Plot Establishment and Monitoring

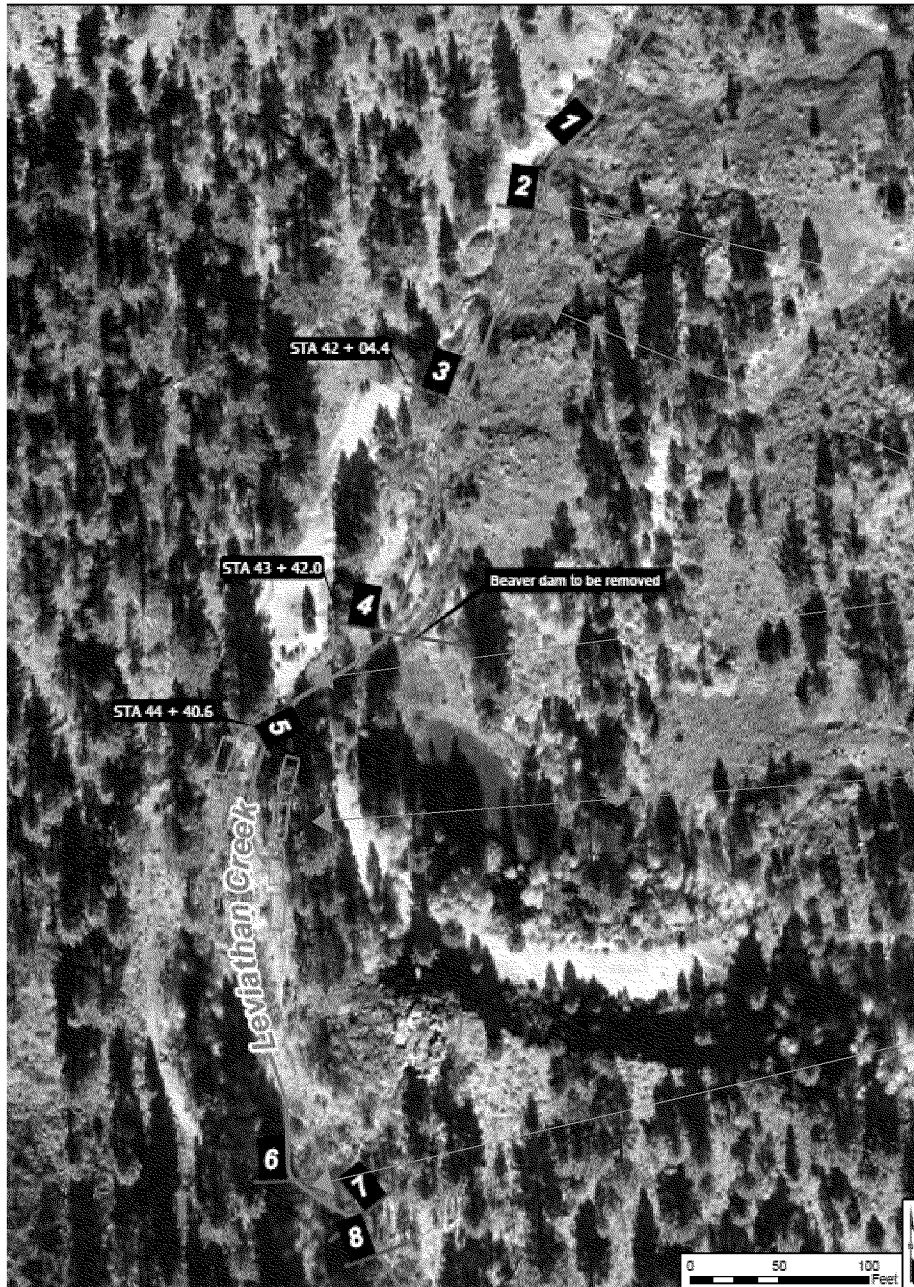
- Establish 8-10 test plots in the exposed alluvial areas exposed from the reduction of impounded water volume behind gabion dams constructed.
  - Test plots will be used to study effectiveness of various methods for armoring or stabilizing alluvial material from erosion and downstream migration.
  - Rip rap with filter blanket, direct seeding, seeding using biodegradable erosion control mat, seeding using synthetic erosion control mat.
  - Test plots will each measure approximately 8 feet wide by 20 feet long, and are anticipated to be located where Beaver Pond 5 previously impounded water.
- Perform qualitative and quantitative monitoring of the test plots, remaining dams and constructed gabion dams.
- Gabion dams will need to be monitored and beaver activity controlled per existing depredation permits issued to USFS and LRWQCB in 2016.

# Beaver Dam Locations to be Removed



- Beaver Dams 3, 4, and 5 are currently planned for removal.
- Beaver Dams 3 and 5 will be replaced by lower elevation, flow-through gabion dams.
- Beaver Dam 4 will not be replaced as stored alluvial material from behind the dam will be retained behind the new downstream gabion dam, and any possible mobilized material will be allowed to settle in Beaver Ponds 1 and 2.

# Gabion Dam, Dewatering/Diversion and Test Plot Locations



- Leviathan Creek flow to be diverted from upstream of Beaver Dam 6 and be discharged into Beaver Pond 2.

Approx. flow diversion discharge point

Beaver Dams to be Replaced With Gabion Dams

Test Plots

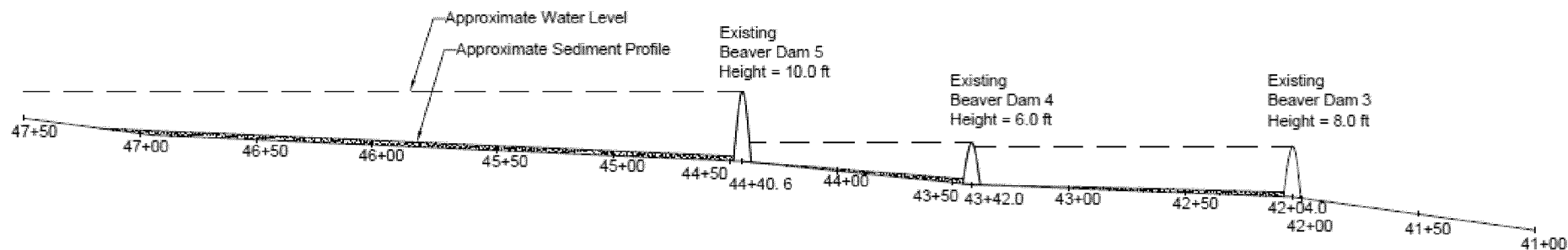
Approx. flow diversion location

# Estimated Beaver Pond Volumes

Pond No.	Approximate Pond Volume (ft <sup>3</sup> )	Approximate Pond Volume (gallons)
1	300	2,300
2	4,200	31,700
3	27,000	202,100
4	34,100	254,900
5	65,200	487,700
6	2,000	15,200
7	1,300	9,500
8	6,600	49,500
9	4,900	36,700
10	1,100	8,300
11	1,200	9,100
12	6,500	48,600
13	2,600	19,800
14	13,000	97,000
15	400	3,200
16	1,600	12,000
17	10900	81,400
18	4,200	31,600
19	200	1,600
20	7,800	58,600
21	6,900	51,300
22	0	0
23	1,200	9,200
24	1,500	11,300
25	2,400	17,600
26	5,000	37,400
27	8,100	60,800
28	900	7,000
TOTALS	221,100	1,655,400

- Pond volumes shown in the table are based on full pond conditions. It is estimated that when work is performed, stored volumes in each pond will be significantly less than the volumes shown and will allow for possible storage capacity in the event of an upstream release.
- Volumes were calculated based on existing topographical maps and previous beaver dam measurements.
- Beaver Dams 3, 4, and 5 currently impound ~944,700 gallons when full, ~57% of the total impounded water in the beaver dam/pond complex when full.
- Replacement of Beaver Dams 3, 4 and 5 with lower elevation gabion dams will result in reducing full pond impounded water volumes in those locations by ~92%, and overall will reduce the full pond impounded water volume in the beaver dam/pond complex by ~52%.
- Removal of Beaver Dams 3, 4 and 5 will reduce the stored woody debris volume in the complex by approximately 30%.

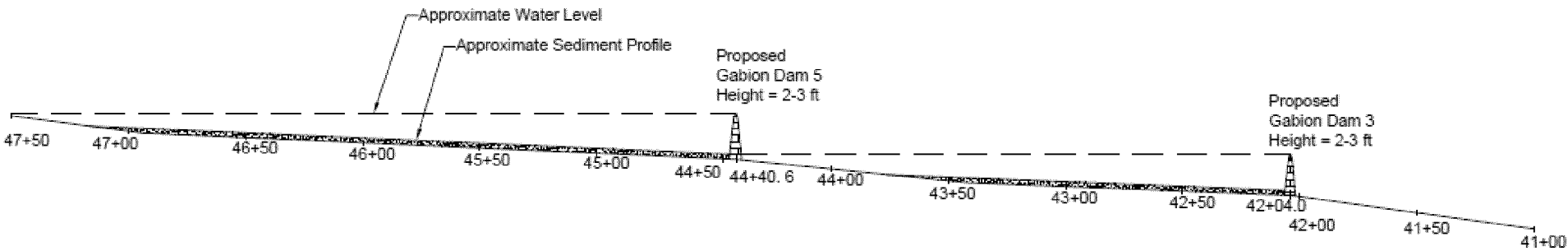
# Current Fluid Hazard Conceptual Site Model



Location	Station (ft.)	Invert Elevation (ft. NAVD88)	Estimated Existing Dam Elevation (ft. NAVD88)	Estimated Existing Dam Height (ft.)
Beaver Dam 3	4204.0	6655.0	6663.0	8.0
Beaver Dam 4	4342.0	6656.8	6662.8	6.0
Beaver Dam 5	4440.6	6660.1	6670.1	10.0



# Proposed Fluid Hazard Conceptual Site Model



Location	Station (ft.)	Invert Elevation (ft. NAVD88)	Estimated Proposed Dam Elevation (ft. NAVD88)	Estimated Proposed Dam Height (ft.)
Gabion Dam 3	4204.0	6655.0	6657-6658	2-3
Gabion Dam 5	4440.6	6660.1	6662-6663	2-3

# Gabion Dam Example



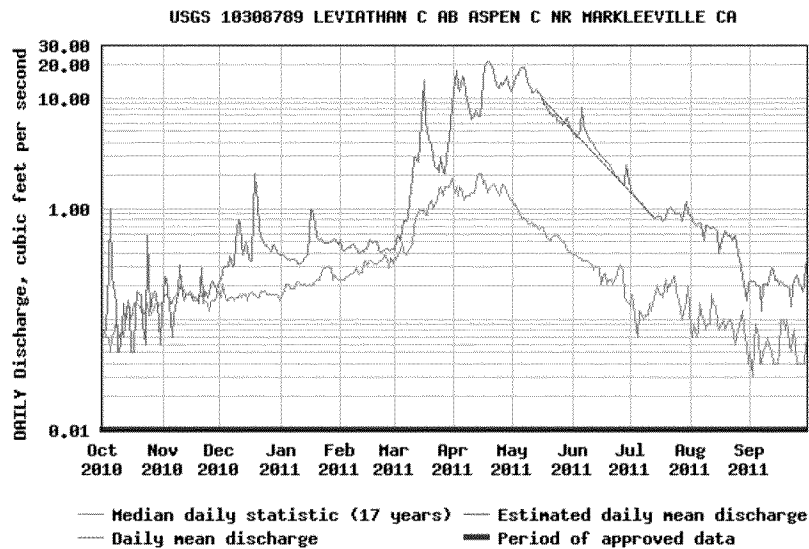
Reference: <http://www.gabionproducts.com/info.php?id=67&u=223>

## 2017 Work Scheduling

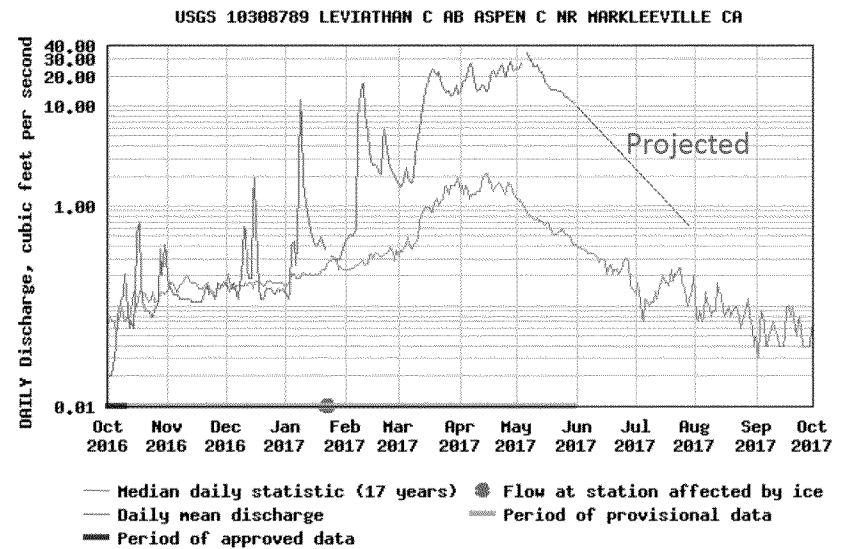
- Survey and dam inspections expected to be performed in June/July.
- Other construction work will be performed in roughly the following order: erosion and sedimentation controls installation, pond dewatering, access road improvement, gabion dam construction, beaver dam removal, and test plot establishment. These tasks are anticipated to begin around mid-August once Leviathan Creek flows (and pond volumes) have diminished to roughly half of the existing flows, making work in and near the ponds safe for workers. This work period is during the dry season at the site when flows are expected to be near their lowest during the field season. Work is expected to be completed for FY 2017 in late September or early October.
- The mid-August timing is near the end of the typical summer thunder storm season and prior to the onset of winter conditions which typically occur in late-October. Stream flows are also typically at their lowest during August through early November.
- The dry weather and low stream flows typically result in much reduced water volume being contained in the upper ponds, upstream of Beaver Dams 3, 4, and 5, thus providing additional storage capacity in the event that it is needed to mitigate streamflow variations due to precipitation, dam breach, or on-site operations.

# Streamflow In Beaver Complex Projected to Decline to 1-5 cfs in July

- Water Year 2011

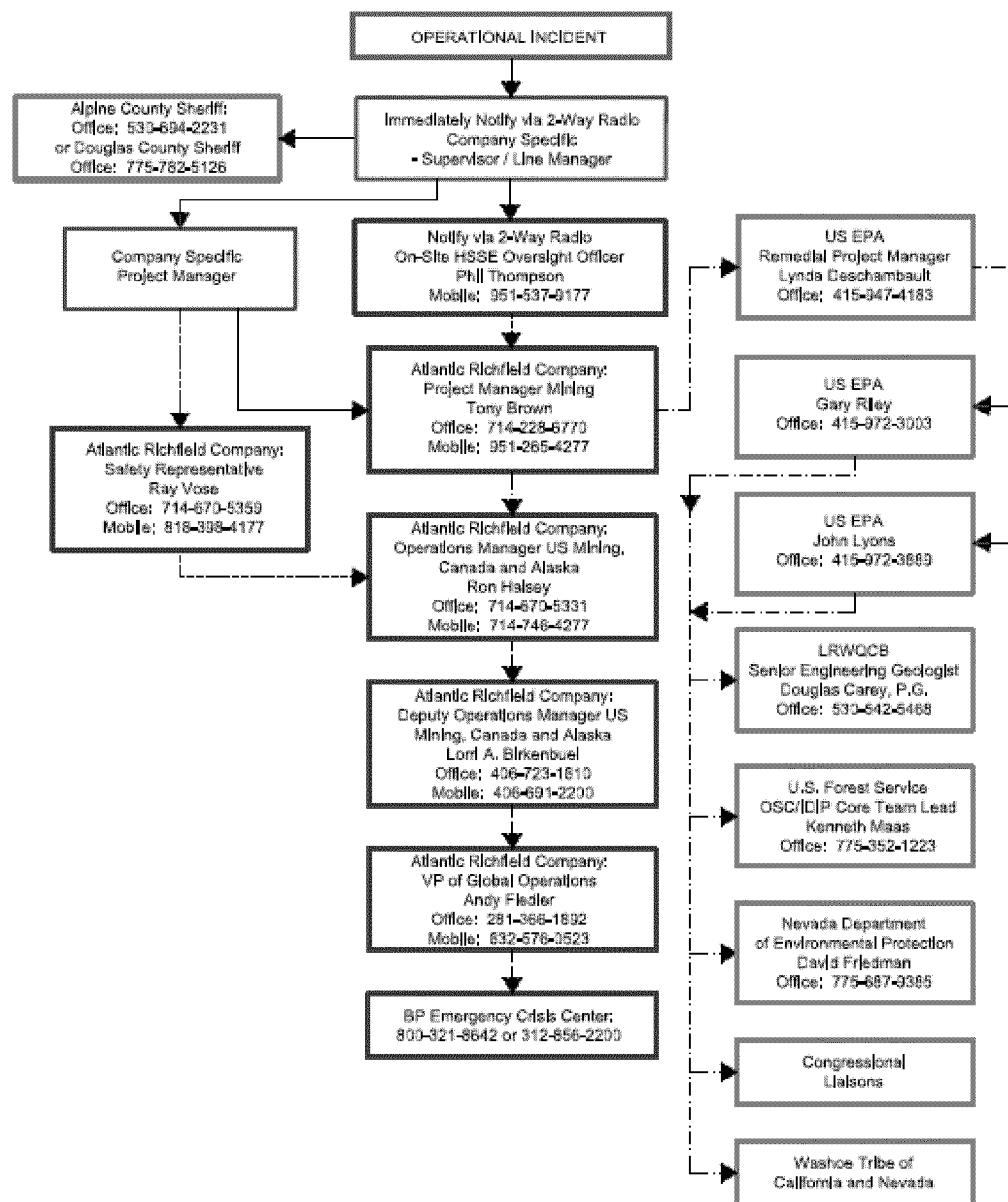


- Water Year 2017



## 2017 Communication, Monitoring and Reporting

- Daily reporting will be performed similar to that provided during the Amendment 10 implementation, including:
  - Work tasks performed previous day, work tasks planned for current day and work tasks planned for the following work day. Any schedule updates would also be indicated in the daily report.
- Daily remote monitoring of flows will be performed at SW-15, downstream from the beaver dam/pond complex. Significant flow anomalies will be reported in accordance with an emergency call-out tree similar to that prepared for the previous Amendment 10 beaver pond work. An example call-out tree from previous work is included below and will be updated based on current information.
- The task leader will have on hand a satellite phone and two-way radio during work periods within the Beaver Dam/Pond Complex. On-Site work is expected to be conducted only during week days.



**LEGEND:**

- Notification for every operational incident.
- Notification for any first aid or greater injuries, any material release, or any property damage.
- .-.-.-.- Notification on an as-needed basis.

**FIGURE D-9**  
**EMERGENCY CALL-OUT TREE**  
Levlathan Mine Site  
Alpine County, California

Date: 9/25/2015

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